Contents

NUMBER 210

FRY, S. C. The Structure and Functions of Xyloglucan (REVIEW ARTICLE) 1

ELLIS, R. H., HONG, T. D., and ROBERTS, E. H. Response of Seed Germination in Three Genera of Compositae to White Light of Varying Photon Flux Density and Photoperiod 13

HSIAO, A. I., and VIDAVER, W. Effects of Repetitive Acid Immersion, Red Light, and Gibberellin A_3 Treatments on Phytochrome-mediated Germination Control in Skotodormant Lettuce Seeds 23

KERMODE, A. R., PRAMANIK, S. K., and BEWLEY, J. D. The Role of Maturation Drying in the Transition from Seed Development to Germination. VI. 33

LAWLOR, D. W., KONTTURI, M., and YOUNG, A. T. Photosynthesis by Flag leaves of Wheat in Relation to Protein, Ribulose *Bis*phosphate Carboxylase Activity and Nitrogen Supply 43

BORLAND, A. M., and GRIFFITHS, H. The Regulation of Citric Acid Accumulation and Carbon Recycling during CAM in *Ananas comosus* 53

SCHULTE, P. J., and NOBEL, P. S. Responses of a CAM Plant to Drought and Rainfall: Capacitance and Osmotic Pressure Influences on Water Movement 61

SHEN, L., FOSTER, J. G., and ORCUTT, D. M. Composition and Distribution of Free Amino Acids in Flatpea (*Lathyrus sylvestris* L.) as Influenced by Water Deficit and Plant Age 71

BARLOW, P. W., and ADAM, J. S. The Response of the Primary Root Meristem of *Zea mays* L. to Various Periods of Cold 81

SMIT, B., STACHOWIAK, M., and VAN VOLKENBURG, E. Cellular Processes Limiting Leaf Growth in Plants under Hypoxic Root Stress 89

EVERARD, J. D., and DREW, M. C. Mechanisms Controlling Changes in Water Movement Through the Roots of *Helianthus annuus* L. During Continuous Exposure to Oxygen Deficiency 95

TYERMAN, S. D., and FINDLAY, G. P. Current–Voltage Curves of Single Cl^- Channels which Coexist with Two Types of K^+ Channel in the Tonoplast of *Chara corallina* 105

ULLRICH-EBERIUS, C. I., SANZ, A., and NOVACKY, A. J. Evaluation of Arsenate and Vanadate-Associated Changes of Electrical Membrane Potential and Phosphate Transport in *Lemna gibba* G1 119

GILLET, C., VAN CUTSEM, P., and VOUE, M. Correlation Between the Weight Loss Induced by Alkaline Ions and the Cationic Exchange Capacity of the *Nitella* Cell Wall 129

WICHMANN, F., and KIRST, G. O. Adaptation of the Euryhaline Charophyte *Lamprothamnium papulosum* to Brackish and Freshwater: Turgor Pressure and Vacuolar Solute Concentrations during Steady-State Culture and after Hypo-osmotic Treatment 135

KUMAR, V., and SHARMA, D. R. Isolation and Characterization of Sodium Chloride-Resistant Callus Culture of *Vigna radiata* (L.) Wilczek var. radiata 143

DAVEY, A. G., and SIMPSON, R. J. Changes in Nitrogenase Activity and Nodule Diffusion Resistance of Subterranean Clover in Response to pO_2 149

MAYORAL, M. L., SICARDI DE MALLORCA, M., and DE UZCÁTEGUI, R. C. Comparative Response of Nodulated and Nitrogen-Supplied Cowpea (*Vigna unguiculata* (L.) Walp. var. Tuy) Plants to Infection by Cowpea Mosaic Virus 159

BOOK REVIEWS

JACKSON, M. B. Biomechanisms Regulating Growth and Development. *G. L. Steffens and T. S. Rumsey* 167

MANSFIELD, T. A. Air Pollution and its Influence on Vegetation. Causes; Effects; Prophylaxis and Therapy. *H.-G. Dässler and S. Börtitz* 168

CUTTER, E. G. Plasticity in Plants. Symposium No. 40 of the Society for Experimental Biology. *D. H. Jennings and A. J. Trewavas* 168

THOMAS, B. Light and Plant Growth. Topics in Plant Physiology: 1. *J. W. Hart* 168

ELLIS, R. H. Seed Dormancy and Germination. *J. W. Bradbeer* 169

BRETT, C. T. The Growing Plant Cell Wall: Chemical and Metabolic Analysis. *S. C. Fry* 169

SMIRNOFF, N. The Biochemistry of Plants. A Comprehensive Treatise, Volume 14. *D. D. Davies* 170

NUMBER 211

LEE, H. S. J., SCHMITT, A. K., and LÜTTGE, U. The Response of the C_3-CAM Tree, *Clusia rosea*, to Light and Water Stress. II. 171

PALTA, J. A., and NOBEL, P. S. Root Respiration for *Agave deserti*: Influence of Temperature, Water Status and Root Age on Daily Patterns 181

MCNEILL, A. M., SHEEHY, J. E., and DRENNAN, D. S. H. The Development and Use of a Flow-through Apparatus for Measuring Nitrogenase Activity and Photosynthesis in Field Crops 187

MACDUFF, J. H., and WILD, A. Interactions between Temperature and Nitrogen Deficiency Influence Preferential Uptake of NH_4^+ and NO_3^- by Oilseed Rape 195

MORGAN, M. A., and JACKSON, W. A. Reciprocal Ammonium Transport into and out of Plant Roots: Modifications by Plant Nitrogen Status and Elevated Root Ammonium Concentration 207

GRUSAK, M. A., and MINCHIN, P. E. H. Cold-Inhibited Phloem Translocation in Sugar Beet. IV. 215

HEYSER, J. W., DE BRUIN, D., KINCAID, M. L., JOHNSON, R. Y., RODRIGUEZ, M. M., and ROBINSON, N. J. Inhibition of NaCl-Induced Proline Biosynthesis by Exogenous Proline in Halophilic *Distichlis spicata* Suspension Cultures 225

MCDOUGALL, G. J., and FRY, S. C. Anti-Auxin Activity of Xyloglucan Oligosaccharides: the Role of Groups Other than the Terminal α-L-Fucose Residue 233

VANSELOW, K. H., KOLBOWSKI, J., and HANSEN, U.-P. Further Evidence for the Relationship between Light-Induced Changes of Plasmalemma Transport and Transthylakoid Proton Uptake 239

VANSELOW, K. H., KOLBOWSKI, J., and HANSEN, U.-P. Analysis of Chlorophyll Fluorescence by means of Noisy Light 247

HASHIMOTO, H., and POSSINGHAM, J. V. DNA Levels in Dividing and Developing Plastids in Expanding Primary Leaves of *Avena sativa* 257
GRANATO, T. C., and RAPER, C. D. Proliferation of Maize (*Zea mays* L.) Roots in Response to Localized Supply of Nitrate 263
RITCHIE, G. A., SHORT, K. G., and DAVEY, M. R. *In vitro* Shoot Regeneration from Callus, Leaf Axils and Petioles of Sugar Beet (*Beta vulgaris* L.) 277
GONTHIER, R., and FRANCIS, D. Changes in the Pattern of Cell Division in the Shoot and Root Meristems of *Lolium perenne* during the Transition from Vegetative to Floral Growth 285
PROBERT, R. J., DICKIE, J. B., and HART, M. R. Analysis of the Effect of Cold Stratification on the Germination Response to Light and Alternating Temperatures using Selected Seed Populations of *Ranunculus sceleratus* L. 293
KERMODE, A. R., DUMBROFF, E. B., and BEWLEY, J. D. The Role of Maturation Drying in the Transition from Seed Development to Germination. VII. 303

BOOK REVIEWS

WILD, A Hungry Crops: A Guide to Nutrient Deficiencies in Field Crops. *N. J. Grundon* 315
HARMEY, M. A. Mitochondrial Biogenesis. *C. J. Leaver and D. M. Lonsdale* 315
MANNERS, J. G. Fungal Infection in Plants. *G. P. Pegg and P. G. Ayres* 315
TANTON, T. W. Russell's Soil Conditions and Plant Growth—11th Edition. *A. Wild* 316

NUMBER 212

PARRY, M. A. J., KEYS, A. J., and GUTTERIDGE, S. Variation in the Specificity Factor of C_3 Higher Plant Rubiscos Determined by the Total Consumption of Ribulose-P_2 317
MACFARLANE, J. J., and RAVEN, J. A. Quantitative Determination of the Unstirred Layer Permeability and Kinetic Parameters of RUBISCO in *Lemanea mamillosa* 321
BESFORD, R. T., and HAND, D. W. The Effects of CO_2 Enrichment and Nitrogen Oxides on some Calvin Cycle Enzymes and Nitrite Reductase in Glasshouse Lettuce 329
GHOMARI, F., HUAULT, C., and BALANGÉ, A. P. Photosynthetic Ability of Radish Cotyledons Grown under Continuous Standard Far-Red Light: Photo-activation of NADP(H) Glyceraldehyde-3-Phosphate Dehydrogenase 337
MARRÉ, M. T., ALBERGONI, F. G., MORONI, A., and MARRÉ, E. Light-induced Activation of Electrogenic H^+ Extrusion on K^+ Uptake in *Elodea densa* Depends on Photosynthesis and is Mediated by the Plasmamembrane H^+ ATPase 343
NIJS, I., IMPENS, I., and BEHAEGHE, T. Effects of Different CO_2 Environments on the Photosynthesis–Yield Relationship and the Carbon and Water Balance of White Clover (*Trifolium repens* L. cv. Blanca) Sward 353
WOODROW, L., and GRODZINSKI, B. An Evaluation of the Effects of Ethylene on Carbon Assimilation in *Lycopersicon esculentum* Mill. 361
GUYE, M. G. Phospholid, Sterol Composition and Ethylene Production in Relation to Choline-Induced Chill-Tolerance in Mung Bean (*Vigna radiata* L. Wilcz.) during a Chill-Warm Cycle 369
SMALL, J. G. C., POTGIETER, G. P., and BOTHA, F. C. Anoxic Seed-Germination of *Erythrina caffra*: Ethanol Fermentation and Response to Metabolic Inhibitors 375
GARCIA-AGUSTIN, P., and PRIMO-MILLO, E. Ultrastructural and Biochemical Changes in Cotyledon Reserve Tissues During Germination of Citrus Seeds 383
REYNOLDS, T. Comparative Effects of Heterocyclic Compounds on Inhibition of Lettuce Fruit Germination 391
CAKMAK, I., MARSCHNER, H., and BANGERTH, F. Effect of Zinc Nutritional Status on Growth, Protein Metabolism and Levels of Indole-3-acetic Acid and other Phytohormones in Bean (*Phaseolus vulgaris* L.) 405

BOOK REVIEWS

GREEN, J. R. Oxford Surveys of Plant Molecular and Cell Biology. Volume 4. 1987. *B. J. Miflin* 413
RAVEN, J. A. Experimental Phycology. A Laboratory Manual. *C. S. Lobban, D. J. Chapman and B. P. Kremer* 413
EVANS, P. K. Progress in Plant Protoplast Research. *K. J. Puite, J. J. M. Dons, H. J. Huizing, M. K. Kool and F. A. Krens* 414
BIRCH, B. Soil Survey Techniques. *W. V. Reybold and G. W. Peterson* 415
BIRCH, B. Soil Testing: Sampling, Correlation, Calibration and Interpretation. *J. R. Brown* 415

NUMBER 213

HILLMER, S., QUADER, H., ROBERT-NICOUD, M., and ROBINSON, D. G. Lucifer Yellow Uptake in Cells and Protoplasts of *Daucus carota* Visualized by Laser Scanning Microscopy 417
MILLS, W. R., REEVES, M., FOWLER, D. L., and CAPO, S. F. DNA Synthesis in Chloroplasts. III. 425
VAN HUYSTEE, R. B., and HODGINS, R. R. W. Chlorophyll Synthesis from Protochlorophyll (ide) in Chill-Stressed Maize (*Zea mays* L.) 431
HEUER, B., and PLAUT, Z. Photosynthesis and Osmotic Adjustment of Two Sugarbeet Cultivars Grown under Saline Conditions 437
KLUGE, M., FRIEMERT, V., ONG, B. L., BRULFERT, J., and GOH, C. J. *In situ* Studies of Crassulacean Acid Metabolism in *Drymoglossum piloselloides*, an Epiphytic Fern of the Humid Tropics 441
BLUM, A. The Temperature Response of Gas Exchange in Sorghum Leaves and the Effect of Heterosis 453
ATKINSON, C. J., and WINNER, W. E. Modification of Stomatal Conductance by Sulphur Dioxide 461
DUDEJA, S. S., and KHURANA, A. L. The Pigeonpea–*Rhizobium* Symbiosis as Affected by High Root Temperature: Effect on Nodule Formation 469
AL-MALLAH, M. K., DAVEY, M. R., and COCKING, E. C. Formation of Nodular Structures on Rice Seedlings by Rhizobia 473
MEIJER, E. G. M. Developmental Aspects of Ethylene Biosynthesis during Somatic Embryogenesis in Tissue Cultures of *Medicago sativa* 479
MILLS, D. Differential Response of Various Tissues of *Asparagus officinalis* to Sodium Chloride 485
OCHATT, S. J., ESCANDON, A. S., and MARTINEZ, A. J. Isolation Culture and Plant Regeneration of Protoplasts of Two Shrubby *Oxalis* Species from South America 493
MINGUEZ, M. I., and SAU, F. Responses of Nitrate-Fed and Nitrogen-Fixing Soybeans to Progressive Water Stress 497

CHRIST, R. A. Records of Source–Sink Relations by Means of Respiration Measurements 503

BOOK REVIEWS

FREER SMITH, P. H. Effects of Atmospheric Pollutants on Forest Wetlands and Agricultural Ecosystems. *T. C. Hutchinson and K. M. Meema* 511

ZIMMERMANN, U. Water Science Reviews. 3. *F. Franks* 511

SHEEHY, J. E. A Century of Nitrogen Fixation Research: Present Status and Future Prospects. *F. J. Bergersen and J. R. Postgate* 511

HARVEY, P. J., and Palmer, J. M. The Biochemistry of Plants: A Comprehensive Treatise. Volume II, Biochemistry of Metabolism. *P. K. Stumpf and E. E. Conn* 512

GALWEY, N. W. Genetic Resources of *Phaseolus* Beans. *P. Gepts* 512

SWAINE, M. D. The Tropical Rain Forest. A First Encounter. *M. Jacobs* 513

NUMBER 214

MACDUFF, J. H., GORDON, A. J., RYLE, G. J. A., and POWELL, C. E. White Clover N_2-Fixation in Response to Root Temperature and Nitrate. I. 517

GORDON, A. J., MACDUFF, J. H., RYLE, G. J. A., and POWELL, C. E. White Clover N_2-Fixation in Response to Root Temperature and Nitrate. II. 527

PEOPLES, M. B., HEBB, D. M., GIBSON, A. H., and HERRIDGE, D. F. Development of the Xylem Ureide Assay for the Measurement of Nitrogen Fixation by Pigeonpea (*Cajanus cajan* (L.) Millsp.) 535

SAH, R. N., GOYAL, S. S., and RAINS, D. W. Effects of Light on NO_3^- Transport by *Azolla pinnata* 543

MACROBBIE, E. A. C., and BURMAN, T. G. Cl^- Fluxes during Osmoregulation in *Chara* 551

BRUMELL, D. A., and MACLACHLAN, G. A. Calcium Antagonist TMB-8 Inhibits Cell Wall Formation and Growth in Pea 559

PRITCHARD, J., WILLIAMS, G., WYN JONES, R. G., and TOMOS, A. D. Radial Turgor Pressure Profiles in Growing and Mature Zones of Wheat Roots—a Modification of the Pressure Probe 567

EAMUS, D., and NARAYAN, A. D. The Influence of Prior Water Stress and Abscisic Acid Foliar Spraying on Stomatal Responses to CO_2, IAA, ABA and Calcium in Leaves of *Solanum melongena* 573

VEERANJANEYULU, K., and RANJITA KUMARI, B. D. R. Proline Metabolism During Water Stress in Mulberry 581

PRESS, M. C., NOUR, J. J., BEBAWI, F. F., and STEWART, G. R. Antitranspirant-induced Heat Stress in the Parasitic Plant *Striga hermonthica*—A Novel Method of Control 585

ARGERICH, C. A., BRADFORD, K. J., and TARQUIS, A. M. The Effects of Priming and Ageing on Resistance to Deterioration of Tomato Seeds 593

ARGERICH, C. A., and BRADFORD, K. J. The Effects of Priming and Ageing on Seed Vigour in Tomato 599

YANIV, Z., RANEN, C., LEVY, A., and PALEVITCH, D. Effect of Temperature on the Fatty Acid Composition and Yield of Evening Primrose (*Oenothera lamarckiana*) Seeds 609

NANDI, S. K., and PALNI, L. M. S. Transport and Metabolism of Dihydrozeatin Riboside in Germinating Lupin Seeds 615

BOOK REVIEWS

BRYANT, J. A. Plant Molecular Biology, 2nd edition. *D. Grierson and S. N. Covey* 623

SPRENT, J. I. Physiological Limitations and the Genetic Improvement of Symbiotic Nitrogen Fixation. *F. O'Gara, S. Manian and J. J. Drevon* 623

NUMBER 215

SAYED, O. H., EMES, M. J., EARNSHAW, M. J., and BUTLER, R. D. Photosynthetic Responses of Different Varieties of Wheat to High Temperature. I. 625

SAYED, O. H., EARNSHAW, M. J., and EMES, M. J. Photosynthetic Responses of Different Varieties of Wheat to High Temperature. II. 633

ARAUS, J. L., TAPIA, L., and ALEGRE, L. The Effect of Changing Sowing Date on Leaf Structure and Gas Exchange Characteristics of Wheat Flag Leaves Grown under Mediterranean Climate Conditions 639

SMITH, B. G. The Effects of Soil Water and Atmospheric Vapour Pressure Deficit on Stomatal Behaviour and Photosynthesis in the Oil Palm 647

KRUGER, E., and SUCOFF, E. Growth and Nutrient Status of *Quercus rubra* L. in Response to Al and Ca 653

KRUGER, E., and SUCOFF, E. Aluminium and the Hydraulic Conductivity of *Quercus rubra* L. Root Systems 659

FYFIELD, T. P., and GREGORY, P. J. Effects of Temperature and Water Potential on Germination, Radicle Elongation and Emergence of Mungbean 667

NAVARI-IZZO, F., QUARTACCI, M. F., and IZZO, R. Lipid Changes in Maize Seedlings in Response to Field Water Deficits 675

FALLON, K. M., and PHILLIPS, R. Responses to Water Stress in Adapted and Unadapted Carrot Cell Suspension Cultures 681

TEZUKA, T., TAKAHARA, C., and YAMAMOTO, Y. Aspects Regarding the Action of CCC in Hollyhock Plants 689

MOHAMMAD, A. M. S., AL-CHALABI, K., and ABOOD, S. A. The Occurrence and Properties of Dihydrofolate Reductase Isolated from Sunflower Callus 693

MOHAMMAD, A. M. S., AL-CHALABI, K., and ABOOD, S. A. Effect of Folate Analogues on the Activity of Dihydrofolate Reductase and Callus Growth of Sunflower 701

PÉREZ, P., MARTINEZ-CARRASCO, R., MARTÍN DEL MOLINO, I. Mª, ROJO, B., and ULLOA, M. Nitrogen Uptake and Accumulation in Grains of Three Winter Wheat Varieties with Altered Source–Sink Ratios 707

BOOK REVIEWS

STEER, M. W. Correlative Microscopy in Biology: Instrumentation and Methods. *M. A. Hayat* 711

REYNOLDS, T. Progress in Clinical and Biological Research 280. Plant Flavonoids in Biology and Medicine II, Biochemical, Cellular and Medicinal Properties. *V. Cody, E. Middleton, Jr., J. B. Harborne, and A. Beretz* 711

EVANS, M. C. W. Plant Pigments. *T. W. Goodwin* 712

NUMBER 216

HANSEN, A. P., PEOPLES, M. B., GRESSHOF, P. M., ATKINS, C. A., PATE, J. S., and CARROLL, B. J. Symbiotic Performance of Supernodulating Soybean (*Glycine max* (L.) Merrill) Mutants during Development on Different Nitrogen Regimes 715

BECANA, M. and SPRENT, J. I. Effect of Nitrate on Components of Nodule Leghaemoglobins 725
RYLE, G. J. A., POWELL, C. J., TIMBRELL, M. K., and GORDON, A. J. Effect of Temperature on Nitrogenase Activity in White Clover 733
LEE, R. B., and DREW, M. C. Rapid, Reversible Inhibition of Nitrate Influx in Barley by Ammonium 741
COOPER, H. D., and CLARKSON, D. T. Cycling of Amino-Nitrogen and other Nutrients between Shoots and Roots in Cereals—A Possible Mechanism Integrating Shoot and Root in the Regulation of Nutrient Uptake 753
TAYLOR, J. R. N., and EVANS, D. J. Action of Sorghum Proteinase On the Protein Bodies of Sorghum Starchy Endosperm 763
OFFLER, C. E., NERLICH, S. M., and PATRICK, J. W. Pathway of Photosynthate Transfer in the Developing Seed of *Vicia faba* L. Transfer in Relation to Seed Anatomy 769
MINCHIN, P. E. H., and THORPE, M. R. Carbon Partitioning to Whole versus Surgically Modified Ovules of Pea: An Application of the *In Vivo* Measurement of Carbon Flows over many Hours Using the Short-Lived Isotope Carbon-11 781
BHADULA, S. K., and SAWHNEY, V. K. Amylolytic Activity and Carbohydrate Levels During the Stamen Ontogeny of a Male Fertile, and a 'Gibberellin-Sensitive' Male Sterile Mutant of Tomato (*Lycopersicon esculentum*) 789
BLACKWELL, J. R., and GILMOUR, D. J. Determination of Volume of *Dunaliella* Cells by Lithium Dilution Measurements and Derivation of Internal Solute Concentrations 795
DUNLOP, J. Phosphate and Membrane Electropotentials in *Trifolium repens* L. 803
FAKHRAI, F., and EVANS, K. Morphogenic Potential of Cultured Explants of *Crocus chrysanthus* Herbert. cv. E. P. Bowles 809
FAKHRAI, H., FAKHRAI, F., and EVANS, P. K. *In Vitro* Culture and Plant Regeneration in *Vicia faba* subsp. Equina (var. Spring Blaze) 813
ABE, S., and TAKEDA, J. Promotion by Calcium Ions and Cytochalasin D of the Rounding Up Process (Spherulation) of Electrofused Barley Protoplasts and its Relation to the Cytoskeleton 819

BOOK REVIEWS

RHODES, I. Alfalfa and Alfalfa Improvement Agronomy Monograph No. 29. *A. A. Hanson, D. K. Barnes and R. R. Hill* 827
BISBY, F. A. 100 Families of Flowering Plants (second edition). *M. Hickey and C. King* 827
JEPSON, P. C. Biological Control of Pests, Pathogens and Weeds: Development and Prospects. *R. K. S. Wood and M. J. Way* 828
SCHWABE, W. W. Plants Today. A bi-monthly Magazine. *L. Haddon and P. D. Moore* 829

NUMBER 217

MELLOR, R. B. Bacteroids in the *Rhizobium*–Legume Symbiosis Inhabit a Plant Internal Lytic Compartment: Implications for other Microbial Endosymbioses (REVIEW ARTICLE) 831
BRANDT, P., and KEIZ, A. Ontogenetic Change of the PSI-and PSII-Distribution in the Thylakoid System of *Euglena gracilis* 841
HAVAUX, M. Comparison of Atrazine-Resistant and -Susceptible Biotypes of *Senecio vulgaris* L.: Effects of High and Low Temperatures on the *in vivo* Photosynthetic Electron Transfer in Intact Leaves 849
AIKMAN, D. P. Potential Increase in Photosynthetic Efficiency from the Redistribution of Solar Radiation in a Crop 855
STARRACH, N., and MAYER, W.-E. Changes of the Apoplastic pH and K^+ Concentration in the *Phaseolus* Pulvinus *in situ* in Relation to Rhythmic Leaf Movements 865
HOFFMAN, R., TUFARIELLO, J., and BISSON, M. A. Effect of Divalent Cations on Na^+ Permeability of *Chara corallina* and Freshwater Grown *Chara buckellii* 875
REID, R. J., SMITH, F. A., and WHITTINGTON, J. Control of Intracellular pH in *Chara corallina* during Uptake of Weak Acid 883
CASAL, J. J., and SMITH, H. Effects of Blue Light Pretreatments on Internode Extension Growth in Mustard Seedlings after the Transition to Darkness: Analysis of the Interaction with Phytochrome 893
DUCKHAM, S. C., TAYLOR, I. B., LINFORTH, R. S. T., AL-NAIEB, R. J., MARPLES, B. A., and BOWMAN, W. R. The Metabolism of *cis* ABA-aldehyde by the Wilty Mutants of Potato, Pea and *Arabidopsis thaliana* 901
WOLTERING, E. J., and HARREN, F. Role of Rostellum Desiccation in Emasculation-Induced Phenomena in Orchid Flowers 907
DAWIDOWICZ-GRZEGORZEWSKA, A., and BÉRANGER-NOVAT, N. Ultrastructural Studies on Development in Mature Seeds; Embryos of *Euonymus europaea* L., Dormant or Cultured at +25 °C 913
MERON, M., GRIMES, D. W., PHENE, C. J., and HUTMACHER, R. B. Shoot Resistance to Water Flow in Cotton 919
CONDON, J. M., and FINERAN, B. A. The Effect of Chemical Fixation and Dehydration on the Preservation of Latex in *Calystegia silvatica* (Convolvulaceae). Examination of Exudate and Latex *in situ* by Light and Scanning Electron Microscopy 925
VOGEL, S. Drag and Reconfiguration of Broad Leaves in High Winds 941

BOOK REVIEWS

COLLIN, H. A. Glossary of Plant Tissue Culture. *D. J. Donnelly and W. E. Vidaver* 949
JONES, M. G. K. Application of Plant Cell and Tissue Culture. *G. Bock and J. March* 949
MAXTED, N. The Use of Plant Genetic Resources. *A. H. D. Brown, O. H. Frankel, D. R. Marshall and J. T. Williams* 950
HARMEY, M. A. Division and Segregation of Organelles. *S. A. Boffey and D. Lloyd* 951

NUMBER 218

CLARKSON, D. T., SAKER, L. R., and PURVES, J. V. Depression of Nitrate and Ammonium Transport in Barley Plants with Diminished Sulphate Status. Evidence of Co-regulation of Nitrogen and Sulphate Intake 953
JARVIS, S. C., and MACDUFF, J. H. Nitrate Nutrition of Grasses from Steady-State Supplies in Flowing Solution Culture following Nitrate Deprivation and/or Defoliation. I. 965

MacDuff, J. H., Jarvis, S. C., and Mosquera, A. Nitrate Nutrition of Grasses from Steady-State Supplies Flowing Solution Culture following Nitrate Deprivation and/or Defoliation II. 977

Thomson, C. J., Atwell, B. J., and Greenway, H. Response of Wheat Seedlings to low O_2 Concentrations in Nutrient Solution. I. 985

Thomson, C. J., Atwell, B. J., and Greenway, H. Response of Wheat Seedlings to low O_2 Concentrations in Nutrient Solution. II. 993

Dell'Aquila, A., and Bewley, J. D. Protein Synthesis in the Axes of Polyethylene Glycol-Treated Pea Seed and during Subsequent Germination 1001

Barratt, D. H. P., Whitford, P. N., Cook, S. K., Butcher, G., and Wang, T. L. An Analysis of Seed Development in *Pisum sativum*. VIII. 1009

Tao, H. P., and Kasarda, D. D. Two-Dimensional Gel Mapping and N-Terminal Sequencing of LMW-Glutenin Subunits 1015

Atkinson, C. J., Davies, W. J., and Mansfield, T. A. Changes in Stomatal Conductance of Intact Ageing Wheat Leaves in Response to Abscisic Acid 1021

Ferreira, R. M. B., Bird, B., and Davies, D. D. The Effect of Light on the Structure and Organization of *Lemna* Peroxisomes 1029

Betsche, T., and Eising, R. Co_2-Fixation, Glycolate Formation, and Enzyme Activities of Photorespiration and Photosynthesis during Greening and Senescence of Sunflower Cotyledons 1037

Grange, R. I., Hammond, J. B. W., and Andrews, J. Characteristics of Starch Grains Isolated from Mature Pepper Leaves Grown under Different Irradiances and Daylengths 1045

Stow, J. The Involvement of Calcium Ions in Maintenance of Apple Fruit Tissue Structure 1053

Koller, D., and Levitan, L. Diurnal Phototropism in Leaves of *Lavatera cretica* L. under Conditions of Simulated Solar-Tracking 1059

Book Reviews

Kirkby, E. A. Advances in Plant Nutrition, Volume 3. *B. Tinker and A. Läuchli* 1065

Black, M. Biotechnology in Agriculture (Advances in Biotechnological Processes Vol. 9). *A. Mizrahi* 1065

Etherington, J. R. Frontiers of Comparative Plant Ecology. *I. H. Rorison, J. P. Grime, R. Hunt, G. A. F. Hendry and D. H. Lewis* 1066

Simmonds, L. Soil Physics (Second Edition). *J. T. Marshall and J. W. Holmes* 1067

NUMBER 219

Lang, A., and Thorpe, M. R. Xylem, Phloem and Transpiration Flows in a Grape: Application of a Technique for Measuring the Volume of Attached Fruits to High Resolution using Archimedes' Principle 1069

Murphy, R., and Aikman, D. P. An Investigation of the Relay Hypothesis of Phloem Transport in *Ricinus communis* L. 1079

Trebacz, K., and Fensom, D. S. The Uptake and Transport of ^{14}C in Cells of *Conocephalum conicum* L. in Light 1089

Paul, M. J., and Cockburn, W. Pinitol, a Compatible Solute in *Mesembryanthemum crystallinum* L. 1093

Hardegree, S. P. Derivation of Plant Cell Wall Water Content by Examination of the Water-Holding Capacity of Membrane-Disrupted Tissues 1099

Thornton, B., and Macklon, A. E. S. Copper Uptake by Ryegrass Seedlings: Contribution of Cell Wall Adsorption 1105

Neales, T. F., Masia, A., Zhang, J., and Davies, W. J. The Effects of Partially Drying Part of the Root System of *Helianthus annuus* on the Abscisic Acid Content of the Roots, Xylem Sap and Leaves 1113

Acaster, M. A., Scott-White, S., and Weitzman, P. D. J. Carbamoyltransferase Reactions in Plants. A Survey for Enzymic Diversity and the Potential for Herbicidal Activity of Transition State Analogue Inhibitors 1121

Hernandez Miñana, F. M., Primo-Millo, E., and Primo-Millo, J. Endogenous Cytokinins in Developing Fruits of Seeded and Seedless Citrus Cultivars 1127

McInnes, E., Davey, M. R., Mulligan, B. J., Davies, K., Sargent, A. W., and Morgan, A. J. Use of a Disarmed Ri Plasmid Vector in Analysis of Transformed Root Induction 1135

Stirling, C. M., Ong, C. K., and Black, C. R. The Response of Groundnut *Arachis hypogaea* L. to Timing of Irrigation. I. 1145

Brewster, J. L., and Butler, H. A. Effects of Nitrogen Supply on Bulb Development in Onion *Allium cepa* L. 1155

Sellstedt, A., Hogberg, P., and Jonsson, K. Diurnal Variation in Acetylene Reduction and Net Hydrogen Evolution in Five Tropical and Subtropical Nitrogen-Fixing Tree Symbioses 1163

Jiang, Z., and Staude, W. An Interferometric Method for Plant Growth Measurements 1169

Book Reviews

Hughes, G. An Introduction to the Physiology of Crop Yield. *R. K. M. Hay and A. J. Walker* 1175

Hall, J. L. The Carnivorous Plants. *B. E. Juniper, R. J. Robins and D. M. Joel* 1175

Hartley, M. H. Plant Molecular Biology: A Practical Approach. *C. H. Shaw* 1176

Barlow, P. W. Vascular Differentiation and Plant Growth Regulators. *L. W. Roberts, P. B. Gahan and R. Aloni* 1176

NUMBER 220

Rayburn, A. L., Auger, J. A., Benzinger, E. A., and Hepburn, A. G. Detection of Intraspecific DNA Content Variation in *Zea mays* L. by Flow Cytometry 1179

Fisahn, J., McConnaughey, T., and Lucas, W. J. Oscillations in Extracellular Current, External pH and Membrane Potential and Conductance in the Alkaline Bands of *Nitella* and *Chara* 1185

Thaler, M., Steigner, W., Förster, B., Köhler, K., Simonis, W., and Urbach, W. Calcium Activation of Potassium Channels in the Plasmalemma of *Eremosphaera viridis* 1195

Williams, L. E., and Hall, J. L. Solubilization, Reconstitution and Characterization of Vanadate-Sensitive. ATP-driven H^+-Transport from Cotyledons of *Ricinus communis* 1205

Williams, L. E., and Hall, J. L. ATPase and Proton-Translocating Activities in a Plasma Membrane-Enriched Fraction from Cotyledons of *Ricinus communis* 1215

Theodoropoulos, P. A., and Roubelakis-Angelakis, K. A. Mechanism of Arginine Transport in *Vitis vinifera* L. Protoplasts 1223

GLASER, A., and DONATH, E. Osmotically-induced Surface Area Expansion in Oat Protoplasts depends on the Transmembrane Potential 1231
BUTLER, D. M., ØSTGAARD, K., BOYEN, C., EVANS, L. V., JENSEN, A., and KLOAREG, B. Isolation Conditions for High Yields of Protoplasts from *Laminaria saccharina* and *L. digitata* (Phaeophyceae) 1237
BORLAND, A. M., and FARRAR, J. F. The Partitioning of Photosynthetically Fixed Carbon in the Leaf Blade and Leaf Sheath of *Poa pratensis* L. 1247
EVERARD, J. D., and DREW, M. C. Water Relations of Sunflower (*Helianthus annuus*) Shoots during Exposure of the Root System to Oxygen Deficiency 1255
LARSSON, M., LARSSON, C.-M., WHITFORD, P. N., and CLARKSON, D. T. Influence of Osmotic Stress on Nitrate Reductase Activity in Wheat (*Triticum aestivum* L.) and the Role of Abscisic Acid 1265
MAO, Z., CRAKER, L. E., and DECOTEAU, D. R. Abscission in *Coleus*: Light and Phytohormone Control 1273
HERNANDEZ, M. N., and DRISS-ECOLE, D. Interaction of Auxin–TIBA in *Lycopersicon esculentum* 1279
MILLARD, P., and THOMSON, C. M. The Effect of the Autumn Senescence of Leaves on the Internal Cycling of Nitrogen for the Spring Growth of Apple Trees 1285

BOOK REVIEWS

VAUGHAN, J. G. Chemistry of Tropical Root Crops: Significance for Nutrition and Agriculture in the Pacific. ACIAR Monograph No. 6. *J. H. Bradbury and D. Holloway* 1291
BAKER, N. R. Applications of Chlorophyll Fluorescence in Photosynthesis Research. Stress Physiology, Hydrobiology and Remote Sensing. *H. K. Lichtenthaler* 1291
MINCHIN, F. R. Nitrogen Fixation with Non-Legumes. *F. A. Skinner, R. M. Boddey and I. Hendrik* 1292

NUMBER 221

ROHOZINSKI, J. E., and ETTEN, J. L. VAN Purification and Characterization of Soluble and Membrane-Associated DNA Polymerases from a Virus PBCV-1 Infected Green Alga *Chlorella* NC64A 1293
THOMAS, B., PENN, S. E., and JORDAN, B. R. Factors affecting Phytochrome Transcripts and Apoprotein Synthesis in Germinating Embryos of *Avena sativa* L. 1299
RINTAMÄKI, E. Formation of Disulphide Cross-Linked Aggregates of Large Subunit from Higher Plant Ribulose-1, 5-*bis*phosphate Carboxylase-Oxygenase 1305
WILKINS, M. B. On the Mechanism of Phase Control by Light in the Rhythm of Carbon Dioxide Output in Leaves of *Bryophyllum fedtschenkoi* 1315
DUNAEVSKY, Y. E., SARBAKANOVA, S. T., and BELOZERSKY, M. A. Wheat Seed Carboxypeptidase and Joint Action on Gliadin of Proteases from Dry and Germinating Seeds 1323
HUBER, D. J., and LEE, J. H. Polygalacturonase Activity in Ripening Tomato Fruit Determined using Pericarp Discs 1331
LOZANO, J. L., WETTLAUFER, S. H., and LEOPOLD, A. C. Polyamine Content Related to Seed Storage Performance in *Zea mays* 1337
CLIFFORD, P. E., DOUGLAS, S., and MCCARTNEY, G. W. Amyloplast Sedimentation in Shoot Statocytes having a Large Central Vacuole: Further Interpretation from Electron Microscopy 1341
WRIGHT, P. J., CHUDEK, J. A., FOSTER, R., and REED, R. H. Turnover of the Intracellular Mannitol Pool of *Fucus spiralis* L. (Fucales, Phaeophyta) during Osmotic Shock 1347
WELBAUM, G. E., and BRADFORD, K. J. Water Relations of Seed Development and Germination in Muskmelon (*Cucumis melo* L.). II. 1355
STIRLING, C. M., BLACK, C. R., and ONG, C. K. The Response of Groundnut (*Arachis hypogaea* L.) to Timing of Irrigation. II. 1363
JEFFERIES, R. A. Water-stress and Leaf Growth in Field-grown Crops of Potato (*Solanum tuberosum* L.) 1375
SQUIRE, G. R. Responses to Temperature in a Stand of Pearl Millet. 9. 1383
SQUIRE, G. R. Responses to Temperature in a Stand of Pearl Millet. 10. 1391
SHARMA, S. N., and SINGH, G. Limitations of Gas Exchanges in Intact Leaves during Ontogeny of Field-grown Chickpeas 1399
BOWLING, D. J. F. A New Porometer Based Upon the Electrical Current Produced by Guard Cells 1407

BOOK REVIEWS

DALE, J. E. Plants and Temperature. Symposium XXXXII of the Society for Experimental Biology. *S. P. Long and F. I. Woodward* 1413
CALLOW, M. Algae and Human Affairs. *C. A. Lembi and J. R. Waaland* 1413
FREEMAN, P. L. Cereal Science and Technology. *G. H. Palmer* 1414